SOIL SURVEY OF THE BROOKINGS AREA, SOUTH DAKOTA.

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LOCATION AND BOUNDARIES OF THE AREA.

Brookings County lies in the central eastern part of South Dakota, and is bounded on the east by the State of Minnesota, on the north by Deuel and Hamlin counties, on the west by Kingsbury County, and on the south by Lake and Moody counties. The area surveyed, which has an extent of 484 square miles, or 309,760 acres, covers nearly fourteen townships, and is bounded on the north by Deuel County, on the

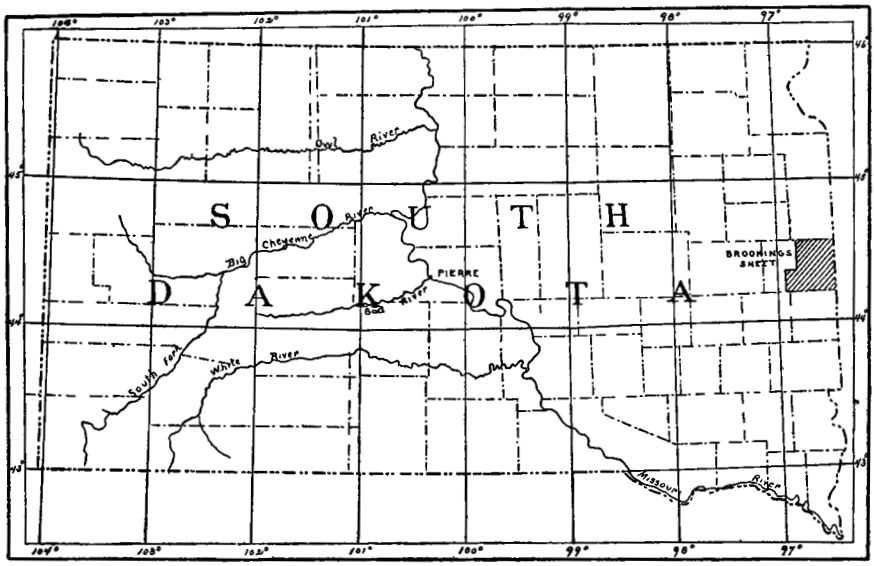

FIG. 48.—Sketch map showing location of the Brookings area, South Dakota.

east by Oak Lake, Sherman, Alton, and Parnell townships, on the south by Moody County, and on the west by the eastern boundaries of Oslo, Volga, Sterling, and Eureka townships.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The first settlement in Brookings County was made in 1869, at which time the Indians, until then the only inhabitants, were very numerous.

The early settlers made their homes along the Sioux River, so as to take advantage of the narrow strip of timber along this stream and the protection from prairie fires which the river afforded. These fires were of frequent occurrence and were a source of great danger and loss to the settlers while the prairie remained unbroken. The lowlands furnished sod for building material, as well as grass for pasturage and hay. The grass on the uplands grew in bunches and formed a poor sod, while in the bottoms it grew thick and tall.

The county was organized in 1871, with the county seat at Medary, a point in the southern part of the county not now shown on the map. At that time there were only 15 or 20 voters in the county.

Fur trading with the Indians was the first industry of the county. Several trading posts were established in the early seventies, one being located at Medary. This proved quite profitable until about 1878, when the county became more thickly settled and the game was largely killed or driven into wilder country.

In 1869 the nearest railroad point was New Ulm, Minn., about 160 miles distant, from which all lumber and provisions were hauled. In 1870 the railroad reached Marshall, Minn., reducing this haul to about 65 miles. The nearest gristmill was at Dell Rapids, about 40 miles from Medary.

In 1873 what is known as the "grasshopper pest" began. It raged with great severity for three years, during which time all crops were entirely destroyed and many of the settlers moved away. In 1876 the grasshoppers disappeared, and this date marks the beginning of the present prosperous condition of the county.

In the early days Volga was the largest town. In 1880 a railroad was built through the county and the town of Brookings was laid out. Subsequently the county seat was removed to this town, which is now the largest and most important town in the county.

CLIMATE.

The climate of Brookings County is that peculiar to a great part of the Northwest. In general it is very healthful, though subject to great extremes of temperature. The winters are long and somewhat severe. The cold, however, is rendered less noticeable by the dryness of the air. The summers are short and quite pleasant, and although at times it is extremely hot during the day it is generally cool at night.

The winds are a very important factor in the climate of this region, strong winds being very frequent in every season of the year. During the spring they blow usually from the southeast, though there may be periods of northwest winds which continue more or less until May or June, when the weather becomes more settled. During the latter part of June and the months of July and August the prevailing winds

are from the south. At this time they are usually hot and frequent dust storms occur. During these months also thunderstorms are frequent, with occasionally a tornado. Through September, October, and November the winds are quite variable and have no general direction, while those of December, January, February, and March blow generally from the north or northwest and give rise to many blizzards and very low temperatures.

The average annual rainfall of this section is sufficient for the production of good crops, but the variability of the precipitation during the growing season is often a serious matter. Although there is no regular season of drought, yet, besides variations from year to year, there are certain months during which a comparatively light rainfall can be expected.

The following table, taken from records of the Weather Bureau stations at Brookings and Flandreau, shows the normal monthly and annual temperature and precipitation in this area:

Normal monthly and annual temperature and precipitation.

Month.	Brookings.		Flandreau.		Month.	Brookings.		Flandreau.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	*Inches.*	°F.	*Inches.*		°F.	*Inches.*	°F.	*Inches.*
January	11.5	0.43	13.3	0.42	August	67.6	2.38	69.1	2.45
February	12.3	.29	14.0	.52	September	59.6	1.74	62.3	1.74
March	25.5	.72	26.3	1.31	October	45.4	1.13	48.1	1.48
April	45.8	2.48	47.0	3.09	November	27.5	.44	28.4	.72
May	55.3	2.81	56.7	3.93	December	20.5	.50	18.9	.62
June	65.4	3.36	66.6	4.04	Year	41.3	18.58	42.6	23.25
July	69.8	2.30	70.4	2.92					

This section frequently experiences low temperatures during the growing season. While the temperature often goes below the freezing point, a killing frost does not always occur. Records kept from 1889 to 1902 show that July is the only month during which the temperature did not fall below freezing. During May the temperature went down to freezing in every year except 1896 and 1902; during June it fell to that point only in 1897, 1900, 1901, and 1902; during August it went below 32° in 1891, 1893, and 1894, while September shows freezing weather every year during the period given. The lowest temperature yet recorded was during January, 1889, when the thermometer registered −41° F., and the highest was in July, 1894, when it registered 104° F.

PHYSIOGRAPHY AND GEOLOGY.

The geological formations of the Brookings area belong to the Glacial period. There are no outcrops of basal rock in Brookings

County, the whole being covered by glacial drift to a depth of from 25 to 75 feet. The soils, therefore, are primarily of glacial origin, and their mineral content is drawn from a great variety of rocks. These belong principally to the Archean time, being widely differing granites, granitic gneisses, and dark, fine-grained rocks of the ferro-magnesium group. There are some schistose rocks and, in places, much limestone within the area. The proportions of limestone and softer rocks, however, vary in different parts of the county. In the west and southwest there are almost none of them, probably due to the fact that in that part of the county the drift was subjected to greater grinding than in the eastern and central parts. Limestone bowlders and rocks are common in the northeastern part of the area, and in the central part this rock comprises a large part of the gravel deposits, though few large bowlders are found.

The area has been subjected to more than one glaciation, and the last, or Wisconsin, glacial sheet did not cover the entire area. About 18 miles west of Browns Valley the outer terminal moraine of this sheet forms roughly a semicircle, the eastern end of which extends slightly southeast and the western end almost south down through the State, leaving an inverted V-shaped portion of the next, or Iowa, sheet exposed. Within this semicircle lies the greater part of the area surveyed.

The exposed Iowa sheet shows the effect of greater erosion and longer weathering, and gives rise to soils containing more sand than those of the Wisconsin sheet or those which are influenced by it. The soils as a rule become more heavy and loamy as the moraines on each side of the area are approached.

The area between these moraines is called the Sioux Valley. In this county it consists of rolling and level upland prairie cut by numerous stream valleys, some of which are narrow, while others are broad and flat. The Sioux Valley proper ranges from 1 to 3 miles in width.

The Sioux River, a sluggish and meandering stream, is the most important one in the county and receives almost the entire drainage. It flows in a generally southeasterly direction and leaves the county through Medary Township. It is joined by many smaller streams, some of which are merely old river channels which may yet be very distinctly traced.

There are a few old lake beds in the county which are either being cultivated or are almost dry. The old settlers remember when these contained several feet of water. Possibly a slight lowering of their outlets, increased washing in of soil due to cultivation, and the fact that cultivation has rendered the soil more porous, so that it holds more water, accounts for their disappearance. Some of these lakes were bordered by a growth of timber, the most of which has been removed.

The southeastern part of the area is very flat and level. This topog-

raphy continues, generally speaking, northwest past Bushnell to a line drawn from Brookings to White, circles about Aurora, and joins or is a continuation of the broad lowland area between Aurora and Brookings.

The western part of Volga Township is quite rolling. This rolling topography continues through the western and southern halves of Oslo Township and tapers to the southeast to the point where the Sioux River leaves the county. Between this region and the Sioux Valley proper the topography becomes less rolling and broadens out into a wide, flat area. This plain again becomes narrower north of Volga. The northeastern part of the county is very rough and is deeply cut by small streams, giving rise to many gorges and picturesque valleys.

SOILS.

There are five types of soil in the Brookings area, the extent of each of which is given in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Marshall loam	135,808	43.8	Sioux sandy loam	28,864	9.3
Marshall sandy loam	93,376	30.1	Marshall stony loam	8,256	2.7
Miami black clay loam	43,456	14.0	Total	309,760	.....

MARSHALL SANDY LOAM.

The Marshall sandy loam is a compact black sandy loam about 10 inches in depth. The sand varies from medium to fine; occasionally gravel, rounded pebbles, and bowlders are found on the surface. The bowlders are largely granite, granitic gneiss, etc., while the gravel and pebbles are made up of the same material, with a large quantity of limestone and "greenstone" and a small quantity of quartzite. Beneath the soil there is about 6 inches of yellowish loam containing some sand. From 16 to 36 inches below the surface there is generally a yellowish clay containing a high percentage of coarse sand and gravel. Calcareous nodules in a partially decomposed state, forming white spots in the subsoil, are often found. There are some places where the clay is entirely absent from the subsoil, thus making it one of coarse sand and gravel. These areas are usually found near the streams, where this type grades into the valley or lowland types. Had these areas been large enough to be shown on the map they would have been classified as a separate type. Such a subsoil makes the soil quite undesirable, as it will not hold sufficient moisture to carry crops over the dry season that often sets in during the summer months. Crops are sometimes almost an entire failure on these areas.

The sandier phase of the Marshall sandy loam is found on the ridges

near the valleys. In some cases these appear to be old shore lines and have probably been formed by the action of waves or running water, which very likely explains the origin of the sandy subsoil occurring in many places. These ridges are often only a few rods in width, the sand content decreasing as the soil extends back from the valley.

In the narrow depressions occurring in the Marshall sandy loam the soil is somewhat heavier than on the ridges. This is also the case where this type grades into the Marshall loam, as the gradation, where the soil is neither typical Marshall loam nor Marshall sandy loam, is often a mile or more in width. On account of this gradation some trouble was experienced in drawing the line between these two types, the most difficult area being east of White.

The Marshall sandy loam occupies the gently rolling prairie and narrow depressions, forming a very beautiful landscape. The larger part of this soil occurs as a broad area almost in the center of the area surveyed, broken only by narrow strips of Miami black clay loam and occasional areas of Sioux sandy loam. This type is one of the important types of the area and covers about one-fourth of the area surveyed.

On this soil, north of Brookings, are found some of the best improved farms to be seen in the county. The soil is well adapted to general farming. Wheat yields on an average from 12 to 20 bushels, oats from 20 to 35 bushels, flax from 12 to 15 bushels, and potatoes from 100 to 125 bushels per acre.

The following table of mechanical analyses of samples of fine earth will convey an idea of the texture of the soil and subsoil of this type:

Mechanical analyses of Marshall sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
8806	NE. cor. sec. 34, Brookings T.	Black sandy loam, 0 to 8 inches.	6.73	1.10	6.96	8.20	20.20	24.54	32.30	6.76
8808	NE. cor. sec. 10, Brookings T.	Black sandy loam, 0 to 10 inches.	1.19	.70	4.90	12.50	33.36	18.58	22.90	7.06
8810	NE. cor. sec. 17, Sterling T.	Black sandy loam, 0 to 10 inches.	3.35	1.70	11.00	11.50	18.40	20.70	29.76	7.16
8809	Subsoil of 8808....	Yellow clay loam, 10 to 36 inches.	.53	.40	2.60	5.40	14.30	21.20	39.32	16.90
8811	Subsoil of 8810....	Yellow loam, 10 to 36 inches.	.90	1.60	8.00	8.30	12.00	20.60	32.24	17.38
8807	Subsoil of 8806....	Yellow clay loam, 8 to 36 inches.	Tr.	1.90	5.40	5.60	15.00	14.80	34.90	22.28

The following samples contained more than one-half per cent of calcium carbonate ($CaCO_3$): No. 8807, 9.20 per cent; No. 8811, 2.60 per cent.

SIOUX SANDY LOAM.

The surface soil of Sioux sandy loam is a black sandy loam from 8 to 12 inches deep. Apparently the sand is usually of coarse texture, though analysis shows it to be made up about equally of the coarse, medium, and fine grades, and sometimes the field appearance is that of a fine sand. The soil contains sufficient silt and clay to make it a rather heavy sandy loam. The organic matter content of this soil is quite high. On drying it bakes to a certain extent, and when broken up forms clods. It is not difficult to cultivate, however, and when in the highest state of cultivation it is very mellow. The subsoil is nearly always a coarse sand, but is occasionally a gravel. There are small areas where it is a drab or dark yellowish clay. These clay subsoil areas are considered among the best soils in the county, but they are comparatively small and often the type is spotted with them. Even if they were large enough to represent on the map it would be a very difficult problem to locate them. Borings have been made where the sandy subsoil would be found, and just a few rods away the clay subsoil. There were some areas where six borings were made on one or two acres, half of them showing a sandy subsoil and the other half a clay subsoil. The clay subsoil varies from 1 to 4 feet in depth. In almost every case sand was found at a depth of from 4 to 6 feet. The clay subsoil areas are clearly indicated during a dry season by the better condition of the crops.

Coarse sand and gravel deposits occur as rounded knolls in the Sioux sandy loam. They rise from 1 to 2 feet above the adjacent soil and would be classified as a gravelly loam if they were large enough to be represented on the map. They range from one-fourth of an acre to 2 acres in extent.

On account of its sandy subsoil, which makes it very droughty, the Sioux sandy loam has a lower value than any of the other soils in the area excepting very stony areas of the Marshall stony loam. The price of this soil ranges from $20 to $30 per acre, depending on the proportion of the area of clay subsoil. It is adapted to oats, wheat, barley, and, in good seasons, to grass and corn.

The following table of mechanical analyses of samples of fine earth will convey an idea of the texture of the soil and subsoil of this type:

Mechanical analyses of Sioux sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
8826	NE. cor. sec. 15, Medary T.	Black sandy loam, 0 to 10 inches.	1.46	7.50	23.80	12.74	15.80	5.50	21.00	13.40
8828	SE. cor. sec. 11, Medary T.	Black sandy loam, 0 to 9 inches.	5.26	2.66	18.10	16.60	18.36	6.90	19.44	17.72
8829	Subsoil of 8828....	Coarse yellow sand, 9 to 36 inches.	.52	2.90	20.42	22.48	31.40	7.00	6.50	9.36
8827	Subsoil of 8826....	Coarse yellow sand, 10 to 36 inches.	.91	6.30	22.60	17.60	21.10	6.80	14.60	10.80

The following samples contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 8828, 8.80 per cent; No. 8829, 4.20 per cent.

MARSHALL STONY LOAM.

The Marshall stony loam consists of a dark-brown to black loam or sandy loam to a depth of 8 inches. It contains considerable quantities of gravel and small stones, the surface usually being thickly strewn with bowlders. From 8 to 36 inches the subsoil is a yellow clay loam, mixed with gravel and small quantities of sand. In many cases the stones are so numerous that it is impossible to make a boring over 6 or 12 inches in depth. There are some areas of 50 to 100 acres in extent over the most of which a person could walk without stepping off the bowlders.

This type lies in the extreme northeastern part of the area surveyed, being almost entirely in Oak Lake and Sherman townships. It covers only a small proportion of the map, but had the survey continued farther east large areas would have been encountered. This soil is found on the terminal moraine of the Wisconsin glacial sheet. Owing to this fact the topography is more rolling than that of any of the other types surveyed. Streams have cut their way down, forming narrow gorges and a few valleys. The bowlders are more noticeable near the streams, where they have been left on the surface by erosion, the soil having been washed down into the valleys.

Small lakes are of frequent occurrence in this type, and near the shore line the topography rises to a high elevation. The ridges that extend along the lakes are usually dotted with rounded knobs thickly covered with bowlders of various kinds of rock.

Where the bowlders were not too plentiful they have been removed and the soil cultivated. In many instances they have been used for building fences. While it is true that small areas are cultivated, it would be a very difficult matter in most cases to remove the stones and put the soil in good condition for cultivation. Some of the ridges are so sloping that even if the stones were removed cultivation would not be an easy matter after the sod was broken, as the soil would wash badly.

The Marshall stony loam is used almost entirely for grazing purposes, to which it is best adapted. Only small areas are planted to wheat, flax, and oats, the average yields of which compare very favorably with that of the other soil types of the area.

The following table of mechanical analyses of fine earth samples will convey an idea of the texture of the soil and subsoil of this type:

Mechanical analyses of Marshall stony loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
8812	NE. cor. sec. 14, Oak Lake T.	Black loam, 0 to 8 inches.	6.81	6.08	10.40	8.10	21.42	20.10	26.00	7.90
8813	Subsoil of 8812....	Yellow loam, 8 to 36 inches.	2.22	6.60	10.90	9.40	18.70	14.38	22.10	17.90

The following sample contained more than one-half per cent of calcium carbonate ($CaCO_3$): No. 8813, 12.80 per cent.

MARSHALL LOAM.

The greater part of the Marshall loam lies in the southwest corner and along the eastern boundary of the area surveyed. On the southwest it extends to the Sioux Valley. Near the valley it is only slightly rolling, and in many places there are broad, flat areas. As the distance westward increases, the elevation becomes greater and the topography more rolling, until a series of moraines is reached. The soil of the moraines varies somewhat from that of the low-lying areas, though the general character is very much the same. The principal difference is in the depth, the amount of gravel and stones, and, in a few places, the amount of sand. There is probably a difference of 100 feet or more in elevation between the areas occupying the moraines and the lower-lying areas.

Bordering the Sioux Valley on the west and extending back to the moraines, and also in the vicinity of Bushnell, Aurora, and Elkton,

the soil is a black loam, containing a large percentage of silt and some very fine sand, with a depth of from 10 to 12 inches. Below this there is about 6 inches of yellow loam, somewhat heavier than the overlying soil, under which is a yellow clay loam sometimes containing coarse sand or gravel. The subsoil of this type is the most uniform of any of the types, there being very few variations. The bowlders and small stones in this type are few in number and have mostly been picked off the cultivated areas. The uncultivated areas form a very small percentage of the whole.

The soil among the moraines, which grades from the Marshall loam into the Marshall stony loam, is a black loam from 6 to 8 inches in depth, containing in places a small amount of gravel and coarse sand. These areas are very rolling, and the rounded knobs and ridges, which rise several feet above the adjacent soil, are very stony and gravelly. In some places the stones are so thick that cultivation has not been attempted, while in other places the stones have been partially removed, leaving a very desirable soil. The subsoil here is of the same character as that mentioned above.

The largest and most typical areas of the Marshall loam are found in the Wisconsin glacial sheet. As has been mentioned above, the rougher areas of the Marshall loam are gradations between this type and the Marshall stony loam.

On the eastern side of the area, northeast of White, a small area of stony loam was encountered, but the survey did not extend far enough west to reach the stony loam which occupies large areas in the extreme western part of the county.

The Marshall loam occupies a larger area than any of the other types. It is also the most important soil of the county, being well adapted to general farming. On this soil wheat yields from 15 to 20 bushels, oats from 45 to 50 bushels, and barley from 40 to 45 bushels per acre. The slightly rough areas are usually planted in flax, to which they seem well adapted, yielding from 12 to 15 bushels per acre. The very stony areas, which vary from 2 to 5 acres in extent, are used almost entirely for grazing.

The following table of mechanical analyses of fine earth samples will convey an idea of the texture of the soil and subsoil of this type:

Mechanical analyses of Marshall loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
8816	NE. cor. sec. 11, Oslo T.	Black loam, 0 to 12 inches.	5.79	1.10	2.50	2.50	4.66	17.74	65.20	6.30
8814	NE. cor. sec. 34, Oak Lake T.	Black loam, 0 to 8 inches.	3.92	.44	2.02	2.28	7.34	21.82	55.60	10.50
8817	Subsoil of 8816.....	Yellow clay loam, 12 to 36 inches.	2.73	.70	1.68	1.76	2.54	13.88	62.60	16.90
8815	Subsoil of 8814.....	Yellow clay, 8 to 36 inches.	.69	1.60	3.92	3.30	4.90	16.10	51.40	18.88

The following sample contained more than one-half per cent of calcium carbonate ($CaCO_3$): No 8814, 5 per cent.

MIAMI BLACK CLAY LOAM.

The surface soil of the Miami black clay loam has a depth of from 12 to 18 inches and is very rich in organic matter. During dry seasons it bakes hard and cracks. Where it is in a high state of cultivation and is constantly stirred it forms an ashy loam and baking is not so noticeable. From 18 to 36 inches there is a drab or blue clay, but usually as the depth of the subsoil increases it becomes a little lighter in color. It occasionally contains lime nodules and gravel of various kinds. The subsoil often extends to a depth of 3 feet without any change in character, a condition usual in old lake beds or upland depressions where the accumulation of vegetable matter and materials washed in from the surrounding land has been going on for a long period of time.

Besides the old lake beds and upland depressions this type occupies broad strips on each side of the Sioux River and narrow ones along the valleys of its tributaries. The largest area lies west of Brookings, in Brookings and Medary townships. This follows the Sioux River and has an almost north and south direction. This soil along the Sioux River and its tributaries is largely formed of modified drift material deposited by the streams, though a part of the material has been washed down into the valleys from the uplands.

Some of the lake beds covered with this type of soil and now being cultivated were under several feet of water when the country was first settled. A few have been artificially drained, but the most of them have dried up. Although this soil has a low elevation and water

often stands on it until late in the spring, artificial drainage is not necessary except in a few areas.

As the rainfall is rather uncertain, this soil, on account of its moisture-holding properties and its productiveness, is considered the most valuable one to be found in the area. As the growing season is rather short for some crops, however, a lighter soil—one that warms up early in the spring—is more desirable in case of a late spring. If it were not for the cold nature of this soil it would excel all the others in the production of corn. In good seasons it will yield from 30 to 40 bushels of corn and from 18 to 20 bushels of wheat per acre.

In the low areas, where the drainage is not very good, this soil is used for pasturage or hay, to both of which it seems well adapted.

The following table of mechanical analyses will convey an idea of the texture of the soil and subsoil of this type:

Mechanical analyses of Miami black clay loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
8820	E. side sec. 14, Brookings T.	Black clay loam, 0 to 12 inches.	2.17	0.90	8.00	7.40	16.60	20.60	34.70	11.80
8822	SW. cor. sec. 36, Medary T.	Black clay loam, 0 to 14 inches.	3.48	.44	7.80	8.50	13.30	9.74	36.90	23.30
8821	Subsoil of 8820.....	Drab clay, 12 to 36 inches.	1.19	.00	1.40	1.90	6.04	11.96	52.72	25.80
8823	Subsoil of 8822.....	Black clay, 14 to 36 inches.	2.49	.40	1.40	1.60	8.30	7.00	47.38	33.16

The following samples contained more than one-half per cent of calcium carbonate ($CaCO_3$): No. 8820, 2.20 per cent; No. 8821, 4.60 per cent; No. 8823, 3.80 per cent.

AGRICULTURAL CONDITIONS.

The development of Brookings County has been rapid and the value of property has greatly increased during recent years. In 1893 the assessed valuation, which is about 40 per cent of the real value, was $3,625,298 and in 1902 it was $6,788,793, an increase of over $3,000,000.

About 75 per cent of the farmers own their farms, and mortgages have decreased in recent years. The average farm is about 200 acres, making, according to this estimate, about 2,700 farms in the entire county. Land can be bought for from $20 to $45 per acre. The best land has been sold at a much higher price than this, while in some of the rougher and more stony sections it can be bought for considerably less.

In general the prosperity of the county is well shown by the farm buildings, although these vary somewhat with the soil type and the topography. The primitive sod structures, remnants of which may yet be seen here and there, have given way to farm buildings which would do credit to any farming district. These consist of a good and often expensive dwelling, grain houses, sheds for stock, and generally large and well-built barns, which is very necessary because of the low temperature and severe winds of winter.

Outside of their own families the farmers employ very little help, except during harvesting and thrashing seasons. As a general thing laborers are scarce, and the farmers have learned not to rely upon getting them, but try to manage so as to do their own work. There is a good demand for harvest and thrashing hands at from $2 to $2.50 a day and board. Farm hands get $25 a month and board, but only a few farmers are able to secure such help.

About 25 per cent of the farmers are tenants, the most of whom pay grain rent, giving one-half the crop if the owner furnishes the seed, but only one-third if the renter furnishes it. Very few pay cash rent.

The careless and extravagant methods of agriculture characteristic of most new countries are fast disappearing from this area, although not yet entirely displaced. Some farmers still try to farm a greater acreage than they are able to handle with efficiency, and put in crops when the soil is poorly prepared, in some cases simply forcing the drill into the unplowed soil. Although the greater percentage of the farmers prepare their fields fairly well, more attention should be given to this, as it is very important at times that as much moisture as possible be conserved for the crop. Rolling, followed immediately by light harrowing, would doubtless prove very beneficial in most cases. This would pack the soil and thus cause more moisture to rise from the subsoil, and at the same time the harrowing would largely prevent its escape from the surface. Another remnant of former loose methods is seen in the lack of care of farm machinery. This remains unsheltered the year round, and is very often left in the field where last used. Farmers would save much by building adequate sheds for the protection of their machinery.

Farming in this section becomes more diversified each year. Flax and wheat proved to be the crops best suited to early conditions, and consequently covered almost the entire cultivated acreage for many years, but as the prairie has become broken and cultivated these crops have gradually been replaced by corn, oats, and barley. Corn was at first raised with difficulty, because of the short growing season. This difficulty has been overcome, however, and for several years the crop has been grown quite successfully. Brookings County usually grows enough corn for home needs, and during the best seasons much corn

is shipped to outside markets. Farmers should plant corn rather late, so as to escape early frosts. The seed should be of a quick-maturing native variety. The cultivation should be as level as possible, as this conserves moisture in the soil. A frequent stirring of the soil to a depth of about 3 inches will greatly aid in insuring a good crop almost every year.

The following is authentically said to be a conservative estimate of the yield per acre of the various crops, taken one year with another: Corn, from 30 to 35 bushels; wheat, from 16 to 20 bushels; oats, from 45 to 50 bushels; barley, from 40 to 45 bushels; flax, from 12 to 15 bushels; potatoes, from 100 to 120 bushels.

Up to the present time there has been little attention given to a systematic rotation of crops, and many consider this unnecessary, on account of the great productiveness of the soil. It has been shown, however, by careful experiment, that this is a very important matter, especially in the beneficial effect which one crop may have on that which follows it. The following rotation has been recommended as giving the best results: Corn, followed by wheat, then oats or barley.

The farmers of this area are realizing more and more the importance of stock raising. This industry, which formerly claimed but little attention, is now becoming an important one, as will be seen from the following estimate of the live stock of the county in 1902:

	Number.	Value.
Cattle	15,473	$223,033
Sheep	13,367	25,970
Hogs	11,111	30,539

The dairy interests of the country are not very extensive, but are growing. There are four creameries and one cheese factory now running, and many farmers use hand separators and ship their cream to Sioux Falls and other points.

The country abounds in native prairie and bottom grasses, which furnish the greater part of the pasturage and hay. Red and white clover have been introduced and are grown to a limited extent, but it is often difficult to get a good stand, and the plant is apt to winterkill. Timothy, brome grass, bluegrass, and, in the low grounds, redtop, are easily grown, and are coming into use for hay and pasture. Alfalfa has also been quite successfully grown in an experimental way. All in all, the country is well adapted to the live-stock industry.

The growing of macaroni wheat, for which South Dakota seems especially adapted, bids fair to become a paying industry in this area. The State experiment station has grown and tested many varieties, and selected the best of these, which they find excel the same varieties

grown elsewhere. A limited amount of this seed was sent out to farmers in various parts of the State, and the results were very satisfactory. There has not been enough grown yet to create a general demand at the elevators; besides, there is among the elevator and mill men some objection to it. This obstacle, however, is fast disappearing, the demand is becoming greater, and it seems that the new industry is an assured success.

This wheat is adapted to a moderately dry climate, and under ordinary conditions it will yield from 25 to 100 per cent more than the best varieties of bread wheat. A light to fair crop can be grown during dry seasons, when bread wheat fails entirely. There is little doubt that the soils of the county are well adapted to this wheat, with the possible exception of the Miami black clay loam. Farmers would do well to sow their Sioux sandy loam and the more sandy phases of the other types to this crop because of the poor water-holding properties of the subsoils.

Timber growing in this section has not been a success and there are few good farm woodlots to be found. In possibly 70 per cent of the timber claims was final entry proven, on barely 35 per cent of which the timber is now in good condition, while on over 20 per cent it has been entirely destroyed. Many settlers relinquished their timber claims and took them up as homesteads under the timber-culture laws. Lack of proper cultivation of the trees, a general ignorance of what to plant, and the fact that as a rule the cheapest and shortest lived trees were planted are largely responsible for the present conditions.

There are, however, many good wind-breaks in the county. These should be planted to the north and west and about 100 feet distant from the buildings to be protected. Cottonwood and box elder have so far been most commonly used for this purpose. These have a quick growth, but cottonwood is a comparatively short-lived tree in this section. Native-grown ash, elm, and hackberry have been recommended as more permanent.

The transportation facilities of the area are very good. The wagon roads are quite good almost the year round, except in the lowlands. Two railroads, the Chicago and Northwestern and the Chicago, Burlington and Quincy, traverse the county. Their total mileage within the county is 79 miles, along which are located seven shipping points, each of which has one or more elevators. These towns are so located that the most distant farms are within 14 miles of a shipping point. The most of the products of the area are shipped to Minneapolis, St. Paul, and Chicago.

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U.S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF.

SOIL MAP
SOUTH DAKOTA
BROOKINGS SHEET

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION
E.C. CHILCOTT, VICE DIRECTOR.

R. 51 W. | R. 50 W. | R. 49 W. | R. 48 W.

T. 112 N. | T. 111 N. | T. 110 N. | T. 109 N.

DEUEL | BROOKINGS | CO. | BOUNDARY LINE

U R E K A | A R G O | O A K L A K E

S T E R L I N G | A F T O N | S H E R M A N

V O L G A | B R O O K I N G S | A U R O R A | A L T O N

O S L O | M E D A R Y | T R E N T O N | P A R N E L L

Lake Goldsmith | Volga | BROOKINGS | Aurora | Bushnell | White | Elkton | Lake Campbell

CHICAGO, MILWAUKEE AND ST. PAUL R. R. | CHICAGO, ST. PAUL, MINNEAPOLIS AND OMAHA R. R. | BURLINGTON | CEDAR RAPIDS | NORTHERN | NORTH WESTERN R. R.

BROOKINGS LAKE CO. | BOUNDARY LINE | BROOKINGS MOODY CO. | BOUNDARY LINE

SOIL PROFILE
(3 feet deep)

Marshall stony loam — Sc/St, Scc

Marshall sandy loam — Ssc, Sc, C/s

Sioux sandy loam — Ssc, S

Marshall loam — Sc, Sc, Scc

Miami black clay loam — Scc, Sic, C

LEGEND
St Stony loam
Scc Clay loam
Ssc Sandy loam
Sc Loam
C Clay sand
Clay
S Sand

LEGEND
Ms Marshall stony loam
Msl Marshall sandy loam
Sl Sioux sandy loam
Ml Marshall loam
Mcl Miami black clay loam

Soils surveyed by Frank Bennett, Jr. 1903.

Scale 1 inch = 1 mile

JULIUS BIEN & CO. LITH. N.Y.

Field Operations Bureau of Soils 1903.